

REMARKS

By this reply, claims 9-13 and 19-22 have been amended, and new claims 23-25 added, leaving claims 1-25 pending. Claims 8-12 and 19-22 stand withdrawn from consideration. The specification has been amended to address informalities. Support for the description of 15-35% by weight Cr at page 3, line 28, of the specification can be found in original claim 5, for example.

Reconsideration and allowance are respectfully requested.

Restriction Requirement

M.P.E.P. § 821.04 states:

Where product and process claims drawn to independent and distinct inventions are presented in the same application, applicant may be called upon under 35 U.S.C. 121 to elect claims to either the product or process. See MPEP § 806.05(f) and § 806.05(h). The claims to the nonelected invention will be withdrawn from further consideration under 37 CFR 1.142. ... However, if applicant elects claims directed to the product, and a product claim is subsequently found allowable, withdrawn process claims which depend from or otherwise include all the limitations of the allowable product claim will be rejoined. (Emphasis added).

Claim 8 recites a process that has all of the features of claim 1, which is directed to a product. According to M.P.E.P. § 821.04, once claim 1 is found to be allowable, claim 8 should be rejoined. Claims 9-12 and 19-22 depend from claim 8 and, accordingly, should also be rejoined.

First Rejection Under 35 U.S.C. § 103

Claim 13 stands rejected under 35 U.S.C. § 103(a) over U.S. Patent No. 4,089,682 to Saito et al. ("Saito"), for the reasons stated on page 3 of the Office Action. The rejection is respectfully traversed.

Claim 13, as amended, recites "a Co-based pre-alloyed atomized powder with irregularly shaped particles comprising at least 15% by weight Cr and less than 0.1% by weight C" (emphasis added). Support for the amendments to claim 13 is provided, for example, at page 3, lines 8-11 and 13-15, of the specification. Applicants respectfully submit that Saito fails to suggest the pre-alloyed atomized powder recited in claim 13.

The Office Action states that Saito discloses a reduced powder having a sponge-like structure and comprised of 15-35% Cr, 0.2-3.5% C and balance Co. Saito does not disclose an atomized powder. Applicants submit that it is well known in the art that Saito's sponge-like powder would have a different structure than the claimed atomized powder. In fact, Saito discloses that atomized powders have different shapes and sizes (see column 1, line 61 to column 2, line 37). As such, Saito not only confirms this difference, but teaches away from atomized powders. As stated at M.P.E.P. § 2141.02, page 2100-127, a reference must be considered in its entirety, i.e., as a whole, including portions of the reference that would have led away from the claimed invention. When considered as a whole, Saito teaches away from modifying the disclosed alloy to produce the claimed atomized powder.

Saito also teaches away from modifying the disclosed alloy to have a carbon content of less than 0.1% by weight, as claimed. Particularly, Saito discloses that "it is necessary for the alloy to contain at least 0.2 wt.% carbon" (column 5, lines 36-

40). As such, Saito would have led one having ordinary skill in the art away from the claimed subject matter.

Saito discloses that a carbon powder should be mixed with metal oxide powders in the manufacturing process (column 3, lines 37-39). Saito's manufacturing process includes the following steps: mixing different metal oxides that should be included in the final product and a carbon powder, pulverizing the powders in the obtained mixture; and heating the mixture in order to obtain a sponge-like mass.

In contrast to Saito's disclosure of adding graphite to a mixture of different metal oxides that should be present in the final product, the present inventors unexpectedly found that desirable results can be obtained by admixing pre-alloyed atomized Co-based powders that have a low C content with graphite. Advantageous effects of a low C content in the pre-alloyed atomized powder are demonstrated by the experimental test results reported in Tables 4 and 5, at page 7 of the specification. Mixes 1, 3 and 4 shown in Tables 2 and 3, at page 6 of the specification, included powder 285 containing 0.01 wt.% C. See Table 1 at page 5 of the specification. As described at page 7, lines 14-21 of the specification, the compaction of mixes 1, 3 and 4, without C in the pre-alloyed powder, showed a great improvement with regard to compressibility (see Tables 4 and 5). In addition, the resulting components had high green strengths and green densities. In contrast, Saito does not use atomized pre-alloyed powders and does not suggest the advantageous effects that result from using a pre-alloyed powder having a low carbon content.

For at least the foregoing reasons, Saito would not have rendered obvious the pre-alloyed powder recited in claim 13. Therefore, withdrawal of the rejection is respectfully requested.

Second Rejection Under 35 U.S.C. § 103

Claims 1-7 and 13-18 stand rejected under 35 U.S.C. § 103(a) over U.S. Pub. No. 2004/0237712 to Whitaker et al. ("Whitaker") in view of U.S. Patent No. 4,464,206 to Kumar et al. ("Kumar"), for the reasons stated on pages 3-4 of the Office Action. The rejection is respectfully traversed.

Claim 1 recites a powder metal composition for producing powder metal components, which comprises a Co-based pre-alloyed powder, with irregularly shaped particles comprising at least 15% by weight Cr and less than 0.3% by weight C, admixed with graphite. Applicants respectfully submit that the applied references fail to suggest the claimed powder metal composition.

Whitaker discloses a method for producing a sintered material comprising an alloy selected from one of the groups having a composition comprising in weight %: either Cr 5-30 / Mo 0-15 / Ni 0-25 / W 0-15 / C 0-5 / Si 0-5 / Fe 0-5 / Mn 0-5 / others 10 max / Co balance; or Cr 10-20 / Mo 0-15 / W 0-5 / Fe 0-20 / Al 0-5 / Ti 0-5 / others 15 max / Ni balance. The alloy has incorporated therein from 3-15 weight % of Sn, and optionally from 1-6 weight % of a solid lubricant material. See paragraph [0010] of Whitaker. According to Whitaker, the tin content is critical. Whitaker discloses that "an unexpected advantage of the tin content is that it acts as a powder pressing aid, acting as a die and powder particle lubricant thus, enabling higher green

densities and hence strengths to be achieved at any given pressing pressure” (see paragraph [0017]).

The atomized pre-alloyed powders that Whitaker uses as a starting material in the Examples are conventional commercial powders. See the powder compositions given in Table 1 at paragraph [0039]. These powders differ from the pre-alloyed atomized powder recited in claim 1 by having either a carbon content that is too high (0.5% for Stellite 31) or a Cr content that is too low (8% for Triballoy T400). Whitaker does not disclose an example containing at least 15 wt.% Cr and less than 0.3 wt.% C, as recited in claim 1.

The Office Action acknowledges that Whitaker also fails to disclose the presence of graphite in the powder metal composition. However, the Office Action states that Kumar discloses adding carbon to a pre-alloyed powder of cobalt-base alloy and that it would have been obvious to admix Whitaker's alloy with graphite. Applicants respectfully disagree.

Kumar discloses a process comprising the steps of: comminuting substantially noncompactible pre-alloyed metal powder to flatten the particles thereof; heating the comminuted particles of metal powder at an elevated temperature, the particles adhering and forming a mass during the heating; crushing the mass of metal powder; compacting the crushed mass of metal powder; sintering the metal powder; and hot working the metal powder into a wrought product. See column 1, lines 52-60 of Kumar.

Kumar does not disclose or suggest the significance of a low carbon content of the pre-alloyed powder. In fact, regarding Example 1, Kumar discloses that the

pre-alloyed powder, which had a carbon content of 1.12%, provided quite satisfactory properties (column 2, line 48 to column 3, line 25).

As neither Whitaker nor Kumar suggests the significance of a low carbon content in a pre-alloyed Co-based powder, one having ordinary skill in the art would not have been motivated by their teachings to modify Whitaker in a manner to produce the powder metal composition recited in claim 1.

Furthermore, Whitaker does not disclose the use of graphite and Kumar only discloses that graphite may be added to adjust the chemical composition (column 1, lines 64-65). None of the Kumar examples used a graphite addition and the carbon content of the pre-alloyed powders were both above 0.3% by weight (Example 1) and below 0.3% by weight (Example 2). As such, neither reference suggests the claimed powder metal composition comprising less than 0.3% by weight C admixed with graphite.

Accordingly, claim 1 is patentable. Claims 2-7 and 14-18, which depend from claim 1, are also patentable for at least the same reasons as those discussed with respect to claim 1.

As discussed above, claim 13 recites "a Co-based pre-alloyed atomized powder with irregularly shaped particles comprising at least 15% by weight Cr and less than 0.1% by weight C" (emphasis added). Whitaker and Kumar fail to suggest a Co-based pre-alloyed atomized powder having the Cr and C levels recited in claim 13. Accordingly, claim 13 is also patentable.

For at least the foregoing reasons, withdrawal of the rejection is respectfully requested.

New Claims

Claim 23 depends from claim 13 and recites that "the carbon content is less than 0.05% by weight." Support for claim 23 is provided at page 3, lines 15-16 of the present specification, for example. Claim 24 depends from claim 23 and recites "consisting essentially by weight of 15-35% Cr, 0-20% W, 0-25% Ni, 0-5% Si, 0-5% Fe, 0-10% Mo, balance Co." Support for claim 24 can be found at page 3, lines 27-31 of the present specification. Claim 25 depends from claim 13 and recites "consisting essentially by weight of 15-35% Cr, 0-20% W, 0-25% Ni, 0-5% Si, 0-5% Fe, 0-10% Mo, 0-3% Mn, 0-4% V, 0-4% B, balance Co." Support for claim 25 can be found at page 3, lines 32-34 of the present specification. As discussed above, Whitaker, for example, requires a certain Sn addition.

Claims 23-25 are also patentable.


Conclusion

For the foregoing reasons, allowance of the application is respectfully requested. If there are any questions concerning this reply, to expedite prosecution, the Examiner is invited to contact the undersigned at the number given below.

Respectfully submitted,

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